Phasmidae⁴, the pair of abdominal evertible glands of the imago of the Arctians, Pyrrhoretia isabella and Leucarctia acraea 5. They differ however in not being capable of withdrawal into the body-cavity, as in numerous alcoholic specimens examined they are all of the same general length and size, and moreover the cuticle at and near the base is rough and spinulated like that on the other parts of the body, and besides they are concealed by the dense hairs. I have not perceived any odor emanating from these larvae, which are otherwise sufficiently protected by their venomous setae; these larvae being difficult to handle on this account. Further observations may prove that the secretion is odorous, either oozing trough the rather thick cuticular walls of the process, or remaining within the body and filling the lumen. At all events, the unusual number (seven pairs) of such processes 6 are an archaic feature, and in connection with the composite or generalized structure of the insect in all its stages make it a remarkable and highly interesting form.

Brown University, Providence, R. J. U. S. A.

2. The Development of the Genital Organs, Pseudo-Heart (Ovoid Gland), Axial and Aboral Sinuses in Amphiura Squamata.

By E. W. MacBride BA (Cantab.) BSc (London). (Preliminary Notice.)

eingeg. 21. April 1892.

The investigations which form the subject of the present memoir were carried on in the Zoological Station at Naples, during a period of six months from October 1891 to April 1892. My original object was to study the development of the genital organs in Echinoderms; and *Amphiura squamata* was the only form available at the time of my arrival in Naples.

In tracing the origin of the primitive germ cells, I soon discovered their close relation to the organ which in England is generally called the »heart« or »pseudoheart«. I then traced the development of the latter and of the sinuses in connection with it: and so far as I can

⁴ S. H. Scudder, Odoriferous glands in Phasmidae. Psyche, I., 168, April 14. 1876.

⁵ J. B. Smith, Scent-organs in some Bombycid moths. Entomologica Americana. II. No. 1. p. 79—80. July, 1886. — See also Morrison, H. K., On an appendage of the male *Leucarctia acraea*. Psyche, I., p. 21—22. 1874.

⁶ Here might be mentioned the 8 pairs of retractile lateral abdominal processes of *Phyllocnistis*, mentioned by Chambers in Psyche, III., p. 67, July, 1880, Febr. 12, 1881. p. 135-137, the nature of which need further investigation.

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discover this is the first time that a systematic study of the development of this problematical organ has been made in any Echinoderm.

The literature of the subject shall only be noticed in so far as my results confirm those of other observers.

Unlike some previous workers I have not founded conclusions on sections of adult animals containing Embryos, since in this case not only has one no control over the orientation of the young, but also the preserving fluids often penetrate to them very imperfectly.

In all cases the young were extracted from the mother and orientated by breaking off an arm whilst living so that when decalcified and stained the position of the madreporic plate could be recognized.

Osmic acid was the hardening reagent employed, since the most perfect preservation especially as regards cavities, is obtained by this method. Double staining was also used in every case.

In embryos measuring 200—220 μ in diameter in which the arms are still undeveloped, the coelom is filled by a mass of mesenchyme. Slightly later its cavity is visible as a triangular space at each side of the stomach. Covering the external wall of the stone-canal is a single layer of nuclei, which may therefore be called peritoneal, though they are more roun-



ded than the rest of the peritoneal nuclei. This layer is the first rudiment of the pseudo-heart. Very soon, proliferation can be seen in this layer. The nuclei increase in number, get larger and one can distinguish round one or two of them a rounded cell body. At this stage when the embryo has attained a diameter of 300μ , the first rudiments of the axial sinus are visible. I have been able to distinguish three separate rudiments and to trace their development into the adult: all of these have been confounded by most observers under the name of axial sinus. Ludwig in his »Neue Beiträge zur Anatomie der Ophiuren« in the »Zeitschrift für wissenschaftliche Zoologie, 34. Bd. 1880« has distinguished however one of them, the ampulla, with which the stone canal communicates, from the axial sinus proper. This ampulla (probably of enterocoelic origin) is already visible in my first stage. In the woodcut, Fig. 1, I have called it sinus c and the two others sinus a and sinus b. Sinus a is formed as an involution of the coelom underneath the rapidly growing rudiment of the pseudo-heart; whilst b may be described as a chink between the aboral part of the stone canal and the body wall. The later history of these rudiments may be briefly related. Sinus c persists unchanged, and never communicates with any other cavities than those of the stone canal and the pore canal leading to the solitary madreporic pore. Its size however is relatively less in the adult. Sinus b soon closes, and grows round and embraces the basal part of the stone canal and at a later period extends up on to the sides of the pseudo-heart. Sinus q extends in a lateral direction as a tubular involution of the coelom and forms the rudiment of the aboral »pseudohaemal sinus«. It soon closes and the large cells in the aboral part of the pseudo-heart, migrate along it forming the genital rachis. A similar occurrence has been observed in Asterids by Cuénot in his »Contribution à l'Étude Anatomique des Asterides« in the Archives de Zoologie Expérimentale. Tome V. supplémentaire. With regard to the development of the genital organs, I have to confirm the guess of Hamann (Anatomie der Ophiuriden, Jenaische Zeitschrift für Naturwissenschaft, 23. Bd.) that they are swellings of the genital rachis, having traced all stages in the formation of the ovary. The testes are formed a little later than the ovaries and develop rapidly, so that I have obtained fewer stages in their development.

The relations and distinctness of sinuses a, b and c I have verified on every series of sections I have examined: dealing only with perfect series of well preserved embryos, the sections being in no case thicker than $7^{1/2}\mu$. These relations are shown in Fig. 2, where H a-mann's "Urkeimzellen" are also clearly seen. Where proper precautions are taken to ensure the penetration of the osmic acid, the structure of pseudo-heart appears to be that of a uniformly staining plasma supported by a fibrous network with numerous cells. No lacunae are visible. At its upper oral end it passes into the ordinary connective tissue of the body wall and there is no trace of an oral haemal ring. An aboral haemal ring in the aboral sinus certainly does not exist in this species: the section of the sinus shewing only the "Urkeimzellen" and surrounding endothelial cells. As to radial haemal vessels: from an examination of most perfectly preserved and stained specimens it

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seems to me, that the appearances which have been interpreted as vessels, are due to the cell plasma of the cells on the dorsal side of the nerve cord.

I have in conclusion to express my thanks to. Dr Eisig and Dr. Mayer for many valuable suggestions, especially to the latter for invaluable advice with regard to technique.

The Zoological Station Naples, April 18th 1892.

3. Älteres über Ameisen in Dornen afrikanischer Akazien.

Von Prof. Dr. C. Emery in Bologna.

eingeg. 1. Mai 1892.

In einem in No. 388 des Zoolog. Anzeigers erschienenen Aufsatz über Symbiose zwischen Ameisen und Akazien, schreibt Keller (p. 137): »in der alten Welt ist bis jetzt das Vorkommen myrmekophiler Akazien mit Sicherheit nicht bekannt geworden«. Dieser Satz zeigt, daß dem Verfasser eine in dieser Beziehung interessante Schrift von Fred. Smith¹ entgangen ist. In der Einleitung zu jener sonst rein systematischen Arbeit bespricht Smith die Beobachtungen von J. Monkhouse-Hutchinson über Hymenopteren, welche in Natal die Akaziendornen bewohnen. Er erwähnt zwei Ameisenarten, *Meranoplus intrudens* F. Sm. und *Sima natalensis* F. Sm. sowie eine Biene aus der Gattung *Allodape*. In einigen Dornen, die nach London gesandt wurden, kamen die Ameisen noch lebend an. Es werden auch innerhalb der Dornen Carton-Bauten erwähnt.

Für Nicht-Myrmekologen will ich noch hinzufügen, daß die Gattung *Sima* mit der Gattung *Pseudomyrma*, welcher die typischen Symbioten der amerikanischen Akazien gehören, äußerst nahe verwandt ist. Wahrscheinlich ist die Ameisenfauna der Akaziendornen in Afrika nicht minder reich an Formen als in Amerika².

4. Note on the female Gonophores of Errina labiata.

By Sydney J. Hickson, M.A., Fellow of Downing College Cambridge.

eingeg. 1. Mai 1892.

In the descriptions I have recently given (Quart. Journ. Micr. Sci. Vol. XXIX and XXXII) of the female gonophores of the Hydrocoral-

¹ Description of new species of Cryptoceridae etc. in: Trans. Entom. Soc. London, 1876. p. 603-612. pl. 11.

² Vgl. hierüber meinen Aufsatz »Zur Biologie der Ameisen«. in: Biolog. Centralbl. 11. Bd. p. 165-168.

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